

***Ipomopsis polyantha* (Rydberg) V. Grant (Pagosa ipomopsis)**

Species Conservation Assessment Update

Title of Assessment: *Ipomopsis polyantha* (Rydberg) V. Grant (Pagosa ipomopsis): A Technical Conservation Assessment, USDA Forest Service, Rocky Mountain Region

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Update Summary: Survey work for this species in 2005 resulted in significant changes to the known distribution and number of known individuals of this species. The total population of *Ipomopsis polyantha* was thought to be roughly 10,000 individuals at the time the assessment was written. 2005 was apparently a very good year for this species and a population of approximately 500,000 individuals covering approximately two acres was observed at one location. *Ipomopsis polyantha* was found on two sites on public land (City of Pagosa Springs and Bureau of Land Management in 2005. However, threats to all occurrences of this species remain high. The BLM parcel occupied by *I. polyantha* is near Dyke, but it is in the process of being disposed of, under the stipulation that it will be protected under a conservation easement. The large population found near the County Fairgrounds is on private land for which long-range development plans exist. Organized efforts to conserve this species have materialized since the publication of the species assessment. *Ipomopsis polyantha* is now a candidate for listing under the Endangered Species Act.

Distribution: New Information Provided

References: New References Provided

Taxonomic Status: Unchanged

Agency Status: Nominated as a Candidate Species in 2005

Significance of Changes Relative to Original Assessment: Improvements in the understanding of this species and changes to its status require significant changes to many sections of the assessment for this species. Since the publication of this species assessment an organized effort to conserve this species has begun and public awareness of it has increased. However, the threats cited in the assessment and their magnitude have not abated. Although relatively large numbers of individuals were observed in 2005, most were seen on private property on which there is some potential for eventual development. Thus, the discussion of threats in the assessment is still relevant. The nature of new information suggests that a rewrite of this assessment is warranted.

Positive Findings of New or Updated Information and Their Sources

(Note: The Table A checklist attached to this update provides a summary of all sources consulted)

Source 1

U.S. Fish and Wildlife Service. 2005. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions. Federal Register 70(90): 24870-24934.

Summary of New Information

Ipomopsis polyantha was designated a candidate for listing as a threatened species under the Endangered Species Act. It was given listing priority number 2 based on imminent habitat destruction throughout its narrow range.

Relevant Sections of the Conservation Assessment Affected by the Updates

Status, Management Status, Existing Regulatory Mechanisms..., Threats, Conservation Status, Implications and Potential Conservation Elements

Source 2

Dimmitt, M. 2005. Minutes of the first Pagosa Skyrocket Planning Meeting, March 30, 2005.

Summary of New Information

A meeting was held March 30, 2005 to discuss conservation issues for *Ipomopsis polyantha*. The following stakeholders were involved in the meeting:

Archuleta County Roads Dept.
Archuleta County Weed and Pest Dept.
Bureau of Land Management
Colorado Dept. of Transportation
Colorado Native Plant Society
Colorado Natural Heritage Program
CSU Extension Service
La Plata Electric
Natural Resources Conservation Service
Pagosa Garden Club
Pagosa Springs 4-H Clubs
Pagosa Springs Parks Dept.
Pagosa Springs Roads Dept.
Southern Ute Tribe
The Nature Conservancy
U. S. Fish and Wildlife Service
U. S. Forest Service
Interested locals

Jim Miller, Pagosa Springs Parks Superintendent, found two plants on fenced property owned by the Town of Pagosa Springs in 2004. This discovery verified the presence of this species on public lands and was the first report of this species from Town of Pagosa Springs property. He considered the level of threats to be low at this site. There is interest in attempting to propagate the species at this location.

Frank Ratliff, Archuleta County Weed and Pest Manager, noted that the County sprays for weeds along highway right-of-ways but does not broadcast spray.

Jeff Peterson with Colorado Department of Transportation noted that a project in the works to modify access points along Highway 160 in the area of Turkey Creek. The project is not funded but is at least partially designed. Utilities, access and maintenance projects are difficult to reduce impacts.

Ideas generated during this meeting included plans to conduct a survey for the species in the summer of 2005, including the identification of suitable areas to introduce the species. Soil maps by NRCS were to be used to identify the specific soil types where *Ipomopsis polyantha* occurs. *Ipomopsis polyantha* will be included in weed awareness programs and mailings.

Relevant Sections of the Conservation Assessment Affected by the Updates

Distribution, Threats, Tools and practices

Source 3

Lyon, P. 2006. Personal communication with Colorado Natural Heritage Program Botanist regarding *Ipomopsis polyantha*.

Summary of New Information

Field surveys were conducted June 4-June 12, 2005 in an effort to find new locations and to better document the population size and threats of *Ipomopsis polyantha*. All new occurrences were within the areas previously designated as potential conservation areas by the Colorado Natural Heritage Program. 2005 was apparently a very good year for *Ipomopsis polyantha*. It was observed to flower abundantly, and large populations were observed.

Approximately 80 individuals were found on BLM land near Dyke, confirming the presence of this species on federal land. The plants are found in natural vegetation with *Juniperus osteosperma* and *Quercus gambelii*. Other species observed in association with *Ipomopsis polyantha* at this location include *Eriogonum lonchophyllum*, *Townsendia glabella*, *Oryzopsis hymenoides*, *Agropyron cristatum*, *Tetrandeum torreyana*, *Lathyrus eucosmus*, *Hymenopappus filifolius*, *Frasera speciosa*, *Purshia tridentata*, *Juniperus osteosperma*, *Astragalus lonchocarpus*, and *Alyssum parviflorum*. Because most occurrences of *I. polyantha* are in sites that have been moderately to heavily disturbed by human activities, this occurrence is important for conserving this species in its natural habitat.

A dense population of *Ipomopsis polyantha* was found in 2005 on a private parcel adjacent to the Archuleta County Fairgrounds. This property is owned by the Red Ryder Group, and is currently leased for use during fairs and rodeos. *Ipomopsis polyantha* occupies about two acres at this site. Estimates using 3 x 3 foot quadrats indicate that there were at least 500,000 individuals at this site in 2005, and probably more. It is not known whether such high densities will persist at this site in the future, but efforts to monitor this and other patches of this species are planned for 2006 and 2007. The greatest densities were observed in an area that had been bladed by a bulldozer at some time in the past (the date of the disturbance is not known). This is consistent with other observations suggesting that this species can take opportunistic advantage of reduced competition following some types of disturbance.

Permission was granted to collect seed from plants at the Red Ryder site. Seed collection methods were tried in 2005 using a cloth to catch seeds that fell from mature fruits. However, this proved difficult because the seeds mature continuously through the summer, so the seed rain was never heavy enough to collect large amounts of seed at one time. Also, most seeds had already fallen by the time attempts were made to collect them in August and September.

In the assessment, it was estimated that approximately 75% of the population was within Federal Highway right-of-ways and 25% was on private property. However, in 2005 the vast majority (over 95%) was found on a single parcel of private land at the Archuleta County Fairgrounds. There are probably additional plants on private land that was not surveyed in 2005 on both east and west sides of Highway 84.

Estimated total number of plants observed in 2005:

Fairgrounds	>500,000
Other private land	20
Roadsides	7,500
BLM land (at Dyke)	80

Population monitoring efforts are planned for 2006 and 2007, which may involve the establishment of permanent plots at some locations. Denver Botanic Gardens has soil samples from occupied habitat, and will attempt to germinate seeds that may be in the soil of these samples.

Sixty-eight seeds were submitted to the National Center for Genetic Resource Conservation in Fort Collins, Colorado, where they are currently stored.

A meeting was held June 6, 2005 to follow up with discussions begun at the meeting on March 31, 2005 (See Source #2). This meeting was followed by the surveys discussed above.

The meetings and fieldwork conducted in 2005, along with the publication of the species assessment, have greatly increased the profile of this species. There is much more awareness of this species in Pagosa Springs now. At least one company in Pagosa Springs is using the Pagosa skyrocket to promote tourism in the area. While many positive steps were taken towards conserving this species in 2005, it is still highly imperiled throughout its range (see also Sources 4, 5, and 7).



Habitat for *Ipomopsis polyantha* on BLM land near Dyke. *Ipomopsis polyantha* was found at this location in 2005. This area has not been significantly altered by human activities and probably represents the natural habitat for *I. polyantha*. Photo provided by Peggy Lyon, used with permission.



A vegetative rosette of *Ipomopsis polyantha*, June 2005. Photo provided by Peggy Lyon, used with permission.



A bolted plant in bud in June 2005. Photo provided by Peggy Lyon, used with permission.



A newly discovered location for *Ipomopsis polyantha* found on private land in 2005. Photo provided by Peggy Lyon, used with permission.



Censusing roadside portions of an occurrence of *Ipomopsis polyantha* in 2005. Photo provided by Peggy Lyon, used with permission.



The large population at the Archuleta County Fairgrounds in June 2005. Quantitative methods were applied to estimate the population size at this location (approximately 500,000 individuals). Pictured is Dick Moseley using pinflags to assist with this process. Although the population is large, most plants at this location are found within approximately two acres, and this area is planned for eventual development. This site had been scraped by a bulldozer previously. Photo provided by Peggy Lyon, used with permission.



Collection of seed in August 2005 from mature plants at the large population at the County Fairgrounds. Photo provided by Peggy Lyon, used with permission.

Relevant Sections of the Conservation Assessment Affected by the Updates

Distribution and Abundance, Population Trend, Habitat, Threats, Tools and Practices.

Source 4

Brinton, S. 2006. Personal communication with San Juan National Forest Ecologist regarding *Ipomopsis polyantha*.

Summary of New Information

Soil samples

Soil samples were collected from the Red Ryder site in early March 2006. Soil was collected from four separate areas within about ½ acre in the densest portion of the population at this site. This area is approximately 7,150 feet in elevation, flat aspect, and is overwhelmingly dominated by *Ipomopsis polyantha*.

Transplanted individuals

Approximately 75 individuals were salvaged in the summer of 2005 from the highway right-of-way where a new sewer line was installed. Approximately 50 individuals were planted in shaly soil in Brinton's yard, and another 25 were planted in another yard. The plants were watered to prevent desiccation. Approximately 90% of the plants have survived the winter.

Occurrence on BLM land near Dyke

Brinton assisted with survey efforts of the occurrence found on BLM land near Dyke. Some grazing evidence was observed, which is probably the result of wild deer or elk. This occurrence is adjacent to a ranch that maintains a domestic elk herd, but fences prevent grazing at this location by the domestic elk. Plants at this site were widely scattered in pockets of five to 50 individuals. Additional plants were found on the roadcut area adjacent to the highway on a hot dry south-facing slope, where no evidence of grazing was observed.

This site is up for disposal by the BLM and is being exchanged to acquire inholdings at Canyons of the Ancients National Monument. The land will be exchanged with a stipulation that a conservation easement is established in the area inhabited by *Ipomopsis polyantha*. This exchange is still being reviewed in the BLM Regional Office. It will be sold to the Keyah Grande Elk Ranch.

Surveys on the San Juan National Forest

Additional surveys were conducted on National Forest System lands of the San Juan National Forest in 2005. These were focused in the area around the Piedra River and Piedra Road in areas underlain by Mancos Shale. No new occurrences of *Ipomopsis polyantha* were found on 2005, and it is still not known to occur on any National Forest System lands.

Relevant Sections of the Conservation Assessment Affected by the Updates

Management Status, Existing Regulatory Mechanisms..., Threats, Conservation Status, Tools and Practices, Information Needs

Source 5

Mayo, E. 2006. Personal communication with U.S. Fish and Wildlife Service Botanist regarding *Ipomopsis polyantha*.

Summary of New Information

La Plata Electric will be conducting a maintenance project in 2006 in an area occupied by *Ipomopsis polyantha*. The project area extends along Highway 84 at its north end, and then passes through private land west of Highway 84 at its south end (outside the range of *I. polyantha*). La Plata Electric has made efforts to minimize impacts to *I. polyantha* that result from this project. The project will start at its south end where it does not impact *I. polyantha* and proceed north to provide time for crews to survey and mark individual plants and salvage them if necessary.

Mitigation measures for *Ipomopsis polyantha* were provided by Mayo to the Colorado Department of Transportation (CDOT). CDOT has agreed to adhere to these measures, but not formally. La Plata Electric has also indicated that they will conform to these measures.

A sewer line project was started in 2005 in an area occupied by *Ipomopsis polyantha* along Highway 84. Plants were counted within the project area in 2005, and some were salvaged and transplanted (see Source 4). This project may now be completed.

Relevant Sections of the Conservation Assessment Affected by the Updates

Existing Regulatory Mechanisms..., Threats

Source 6

Grant, T. 2006. Personal communication with Denver Botanic Gardens Botanist regarding *Ipomopsis polyantha*.

Summary of New Information

Soil samples from the Red Ryder site were sent to the Denver Botanical Gardens by Sara Brinton (See Source 4 above) on March 7, 2006, to attempt to germinate seeds from the seed bank. Some seeds had germinated in transit, possibly due to warm conditions, and were etiolated when received at Denver Botanical Gardens. The etiolated seedlings were placed in separate pots, and the remaining soil was divided into four treatments (with two replicates of each), as follows:

1. Natural soil heated by heating mats
2. Natural soil unheated
3. Natural soil mixed with horticultural blend (Fafard) and heated by heating mats
4. Natural soil mixed with horticultural blend (Fafard) and unheated

Preliminary results suggest that seed germination is greatest in natural soil without amendments. There is little difference in germination between heated and unheated soils. This may be because the seeds are kept in a greenhouse that is fairly warm, varying in temperature between 50 and 70 degrees F. Over 100 seeds had germinated by April 3, 2006, after having been received and placed in the greenhouse on or before March 22, 2006. However, the seedlings are small and some are probably not *I. polyantha*, making assessment of the results difficult at this stage.

The Denver Botanic Gardens plans to include *Ipomopsis polyantha* among other Four-Corners area species in a new display called "Pueblo and Ruins." They will also request that *I. polyantha* be added to the Center for Plant Conservation's National Collection of Endangered Plants.

Relevant Sections of the Conservation Assessment Affected by the Updates

Habitat, Fertility and Propagule Viability, Demography, Seed Banking, Information Needs

Source 7

Whiting, M. 2006. Personal communication with Southwest Land Alliance Director regarding *Ipomopsis polyantha*.

Summary of New Information

Whiting met with the principals of the Red Ryder group to discuss the possibility of establishing a conservation easement on their property where *Ipomopsis polyantha* was found in 2005. They are hesitant at this stage to commit to a conservation easement on this property. They have no immediate hard surface development plans for this site, but there are long-range development plans for expansion of the Fairgrounds facilities at this site.

The Southwest Land Alliance will hold a perpetual deed restriction to protect *Ipomopsis polyantha* at Dyke once the BLM lands have been disposed at this site.

Relevant Sections of the Conservation Assessment Affected by the Updates

Threats, Tools and Practices

Additional Unabstracted Sources – *pre*-Assessment

(citations pre-dating Assessment publication that were not referenced in it).

None

Additional Unabstracted Sources – *post*-Assessment

(citations post-dating Assessment publication that refer to the target genus but were determined by the reviewer to contain no information requiring an update of the original assessment)

Greer, A. 2005. Pagosa Skyrocket: Meeting of the Minds to Save a Native, Scraggly, Roadside Weed (Newspaper Article). Pagosa Daily Post (March 30, 2005). This article includes a photo of participants in the Pagosa skyrocket planning meeting on March 30, 2005, but contains no new information that is not summarized elsewhere in this addendum; thus it is not abstracted.

Additional Unabstracted Sources – *post*-Assessment

(citations that postdate the publication of the original assessment and that refer to the genus or other related taxa but were determined by the reviewer to contain no information requiring an update of the original assessment)

Aldridge, G. 2005. Variation in Frequency of Hybrids and Spatial Structure Among *Ipomopsis* (Polemoniaceae) Contact Sites. *New Phytologist* 167: 279-288.

Irwin, R. E. and L. S. Adler. 2006. Correlations Among Traits Associated With Herbivore Resistance and Pollination: Implications for Pollination and Nectar Robbing in a Distylous Plant. *American Journal of Botany* 93: 64-72.

Juenger, T., T. C. Morton, R. E. Miller, and J. Bergelson. 2005. Scarlet *Gilia* Resistance to Insect Herbivory: the Effects of Early Season Browsing, Plantapparency, and Phytochemistry on Patterns of Seed Fly Attack. *Evolutionary Ecology* 19: 79-101.

Knight, T. M., J. A. Steets, J. C. Vamosi, S. J. Mazer, M. Burd, D. R. Campbell, M. R. Dudash, M. O. Johnston, R. J. Mitchell, and T. L. Ashman. 2005. Pollen Limitation of Plant Reproduction: Pattern and Process. *Annual Review of Ecology Evolution and Systematics* 36: 467-497.

Price, M.V., N.M. Waser, R.E. Irwin, D.R. Campbell, and A.K. Brody. 2005. Temporal and Spatial Variation in Pollination of a Montane Herb: a Seven Year Study. *Ecology* 86(8): 2106-2116.

Sage, T.L., M.V. Price, and N.M. Waser. 2006. Self-Sterility in *Ipomopsis aggregata* (Polomoniaceae) is Due to Prezygotic Ovule Degeneration. *American Journal of Botany* 93(2): 254-262.

Wu, C. A. and D. R. Campbell. 2005. Cytoplasmic and Nuclear Markers Reveal Contrasting Patterns of Spatial Genetic Structure in a Natural *Ipomopsis* Hybrid Zone. *Molecular Ecology* 14: 781-792.

Checklist of Sources Consulted for Updates to the *Ipomopsis polyantha* Conservation Assessment

Guidelines for Producing Updates

Sources of information relevant to review of this Technical Conservation Assessment for updates include databases, experts, personal communications, published and unpublished literature. Positive results are discussed in detail in the Summary of Addendum to the Technical Conservation Assessment.

Internet Literature Searches: The minimal search for each update consists of Google Scholar, Federal Register, plus a minimum of three other available online literature databases. Search terms include at a minimum: species common name, genus, and recent synonyms. Other keywords will be used at the discretion of the reviewer (e.g., passerine, wetland, rodent). Searches will be constrained to the time beginning two years prior to publication of the Technical Conservation Assessment to the present.

Two attempts were made to contact experts and agency personnel.

Table A. Sources of information consulted for updates to the Species Conservation Assessment.

Source Category	Source/ Name	Date	Results
Announcement from R2 to all FS personnel (including species list)		5/24/2006	No new information.
Internet based literature databases	Google	3/30/2006	No new sources found using search terms: <i>Ipomopsis polyantha</i> , Pagosa skyrocket.
	Google Scholar	3/22/2006	Two new sources for search term: <i>Ipomopsis polyantha</i> . These are included in unabstracted references. No new references found for search term: Pagosa skyrocket.
	Google Book Search	3/22/2006	No new sources for search terms: <i>Ipomopsis polyantha</i> , Pagosa skyrocket
	Federal Register	3/22/2006	One new source (search terms: <i>Ipomopsis</i> AND <i>polyantha</i>)- see reference 1.
	CSU Library Catalog	3/22/2006	No new sources for search terms: <i>Ipomopsis polyantha</i> or Pagosa skyrocket.
	Prospector (searches multiple university libraries in Colorado)	3/22/2006	No new sources for search term: <i>Ipomopsis polyantha</i>
	Scopus	3/16/2006	No new sources for search terms: “ <i>Ipomopsis polyantha</i> ”, <i>ipomopsis</i> AND <i>polyantha</i> . New sources not specific to <i>I. polyantha</i> were found for search term <i>Ipomopsis</i> - see unabstracted references.
	Web of Science	3/16/2006	No new sources for search terms: “ <i>Ipomopsis polyantha</i> ”, <i>ipomopsis</i> AND <i>polyantha</i> . New sources not specific to <i>I. polyantha</i> were found for search term <i>Ipomopsis</i> - see unabstracted references.
	Agricola	3/30/2006	No new sources for search term: <i>Ipomopsis polyantha</i>
	Biological Abstracts	3/30/2006	No new sources for search term: <i>Ipomopsis polyantha</i>

Source Category	Source/ Name	Date	Results
	WorldCat Dissertations and Theses Database	3/22/2006	No new sources for search term: <i>Ipomopsis polyantha</i>
NatureServe affiliate program databases and personnel	Peggy Lyon	3/10/06	New information- see reference 3
State Agency Personnel	Brian Kurzel		No New Information
Federal Agency Personnel	Ellen Mayo	3/31/2006	New information- see source 5.
	Sara Brinton	3/31/2006	New information- see source 4.
Primary experts	Tom Grant	4/3/2006	New information- see source 6.
	Michael Whiting	4/3/2006	New information- see source 7.
Museums and Herbaria	University of Colorado (COLO)	3/30/2006	No new specimens
	Colorado State University (CS)	3/30/2006	No new specimens
Internal USFS Intranet search			Not searched.
Original Author			Author is responsible for addendum

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